PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Method and Apparatus for the Continuous Preparation of Plastics Material Mixtures

We, WERNER & PFLEIDERER of 10, Theodorstrasse, 7000 Stuttgart- Feuerbach Baden-Wuerttemberg, Germany, a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention concerns a method of continuously preparing plastics material mixtures comprising a plurality of components bearing quantitative relationships to one another, in which at least one component of the mixture is or brittle fibre.

Due to economic value of such substances, the use of various types of plastics material, such as polyethylene, polystyrene, polypropylene, polyamides and the like is well known. The plastics material often have substances added thereto which considerably increase their resistance to mechanical stresses. One such substance, having a proved value is glass fibres.

A condition for obtaining a predetermined strength of suitable plastic mixtures permeated with glass fibres is that the glass fibres are accurately determined both in length and in distribution within the plastics mixture. However, in practice, difficulties are encountered in this respect, since only by considerably involved methods was it possible for glass fibre strands to be formed in sections of a certain length and then for the individual sections to be worked into the plastics mixture in an accurately determined quantity. Various proposals for proportioning the individual glass fibre components have already been made, which, however, have not been satisfactory, as it is very difficult to charge the individual glass fibre components to the plastics mixture.

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An object of the invention is to provide a method and an apparatus which permits glass fibres, to be worked into a plastics mixture both in an accurately determined length and in an accurately determined quantity.

According to the present invention a method of continuously preparing plastics material mixtures in a treatment zone comprises mixing a plurality of components in quantitative ratios with one another, at least one component of which is of a brittle fibre substance (such as glass fibre) the brittle fibre component being introduced as continuous strands to the remaining components of the mixture when the remaining components are in a plasticised state, and over the length of the treatment zone breaking the fibre component to a predetermined length after introduction of the strands to the remaining component of the mixture.

According to the present invention an apparatus for the continuous preparation of plastics material mixtures comprises rotatable mixing members arranged in a housing which has an introductory opening for a brittle fibre material which opening is adapted for positioning at any one of a plurality of positions disposed at predetermined distances from a discharge orifice of the housing.

This is attained substantially by supplying the glass fibre of other brittle fibre to the plasticized mixture in a continuous strand which is broken to the required length over the remainder of the treatment path, and conveyed to the discharge end of the apparatus. Thus, one or more glass fibre strands of a predetermined thickness can be continuously supplied to the apparatus by conveyor means the supplying speed of the glass fibre strand being dependent upon the working speed of the conveyor means. The mixing and kneading

members arranged within the apparatus automatically draw in the glass fibres and break them, so governing the length and distribution of the glass fibres. Hence the apparatus produces an accurate length and distribution of the individual glass fibres members and consequently an accurately determinable strength value of the plastics material mixture, which may be discharged from the apparatus, for example, in the form of slabs, strands or even in the form of a granulate.

The final form of the plastics material mixture, possibly requiring further processing may also determine the required length of the individual fibre members. This is achieved by positioning the opening for charging the apparatus with the supply of glass fibre strand at a predetermined distance from the outlet opening of the mixture. This will govern the size to which the fibre is reduced in the mixing process. In the same way the apparatus may have several charging openings arranged in series at certain intervals. Such an arrangement permits the required length of glass fibre strand or strands to be introduced in to the apparatus at any convenient stage. Generally this will be the treatment stage of the plastics material mixture, in which the mixture has, for example, a certain viscosity or plasticity.

Since a variety of plastics material mixtures, having diverse properties are subject to a variety of changes of state over the entire treatment area, it is advisable for the introductory means for the glass fibre to be formed as a unit displaceable along the horizontal axis of the apparatus. It is then possible to supply the strand of glass fibres or any other brittle material at the particular point at which the mixture has reached the most favourable physical state for production. The arrangement can be such that the unit comprises the introductory means is inserted into a suitable longitudinal opening of the apparatus and is displaceable therein. The remaining sections of the longitudinal opening of the apparatus may then be closed by suitable covers or closure members. The selection of a given introductory means or the suitable opening will be guided substantially by the design of the screw machine or extruder and can be modified as necessary.

To cause the supply of glass fibre to be as simple as possible it is advisable to associate with the introductory means guide members such as one or more rollers.

The invention will further be described by way of example and with reference to the accompanying drawings, in which:—

Fig. 1 is a simplified longitudinal section of an apparatus for continuously preparing plastics material mixtures;

Fig. 2 is a simiplified view of an arrangement shown in longitudinal modified section, of a form of apparatus;

Fig. 3 is a simplified view of an apparatus, partly in section of a further modification of the apparatus shown in Figs. 1 and 2; and

Fig. 4 is a sectional view enlarged relative to Figs. 1 to 3 of a fragment of an apparatus in the region of the glass fibre supply.

A pair of mixing or kneading members 2 is arranged within a housing 1 the members being made up of several sections. The members 2 are driven by a motor 3, provided adjacent an end face of the housing 1. The components are introduced through a charging hopper 4 arranged at the end of the housing. The individual components are conveyed in predetermined quantities, from a proportioning device 5, in the form of a proportioning screw conveyor or the like, to the hopper 4. The treatment period for the individual components within the apparatus may be substantially determined by the speed of the mixing, and also by the choice of the pitch of the members 2, so that the mixture is emitted, at an orifice 6 at the end of the housing 1 furthest from the hopper 4, in predetermined shape, for example, in the form of strands, slabs or granulate.

Between the charging hopper 4 and the discharge orifice 6, the housing 1 has an introducing opening 7 arranged on its upper surface through which one or more strands 8 of a brittle material, such as glass fibres, are introduced into the interior of the housing 1 where they are conveyed by the mixing or kneading members 2 at a speed corresponding to the working speed of the mixing or kneading members. The mixing or kneading members 2 break the conveyed, continuous glass fibres 8 into sections of equal length and simultaneously work these evenly into the plastics mixture.

In Fig. 2 of the drawing, an arrangement is shown in which the glass fibres 8 are introduced through an introductory opening 7a located closer to the discharge orifice 6 than the hopper 4. They are then conveyed by the mixing or kneading members 2 up to the orifice 6 and are broken into certain lengths. Any unused introductory openings in the housing may be closed, by suitable closure covers 9.

In the example shown in Fig. 3, one or more strands of the glass fibres 8 are introduced into the housing 1 at any point. For this purpose, the actual introductory opening 7c is provided by a flange 10, which is displaceable within a longitudinal opening 11 formed in the uper surface of the housing 1 or in the individual housing sections. Depending upon the required length of glass fibres, the flange 10 is brought into the suitable position and the remaining sections of the longitudinal opening 11 covered by closure members 9'. This provides a particularly accurate

method of ensuring that the required length of the glass fibre sections is obtained.

Fig. 4 illustrates the arrangement of the mixing or kneading members 2 within the housing 1.

Within the scope of the invention, a variety of modifications are permitted. For instance an arrangement of measuring and control members is readily possible, so that the supply speed and hence the quantity of solid substance charged in the mixture can be accurately controlled. Also a degassing opening, already provided on apparatus, could also be used for introducing the glass fibre strands.

WHAT WE CLAIM IS:—

1. A method of continuously preparing plastics material mixtures in a treatment zone comprising mixing a plurality of components in quantitative ratios with one another, at least one component of which is of a brittle fibre substance (such as glass fibre), the brittle fibre component being introduced as continuous strands to the remaining components of the mixture when the remaining components are in a plasticized state, and over the length of the treatment zone breaking the fibre component to a predetermined length after introduction of the strands to the remaining components of the mixture.

2. An apparatus for the continuous preparation of plastics material mixtures comprising rotatable mixing members, arranged in a housing which has an introductory opening for a brittle fibre material which opening is adapted for positioning at any one of a plurality of positions disposed at predetermined distances from a discharge orifice of the housing.

3. An apparatus as claimed in claim 2, in which a plurality of introductory openings, arranged in series, are provided at predetermined distances from the discharge orifice.

4. An apparatus as claimed in claim 2 or 3, in which the introductory opening or openings for the brittle material is adapted to be displaceable along the horizontal axis of the apparatus.

5. An apparatus as claimed in any of claims 2 to 4 in which any unused introductory opening is adapted to be closed by means of an individual closure cover.

6. A method of continuously preparing plastics material mixtures substantially as hereinbefore described.

7. An apparatus for the continuous preparation of plastics material mixtures substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

POTTS, KERR & O'BRIEN.

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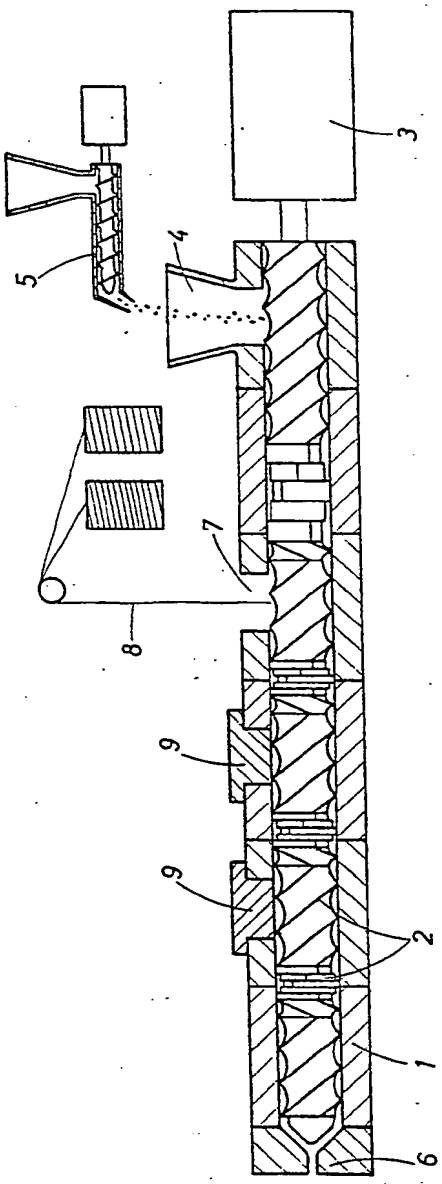

Fig.1

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4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheets 1 & 2

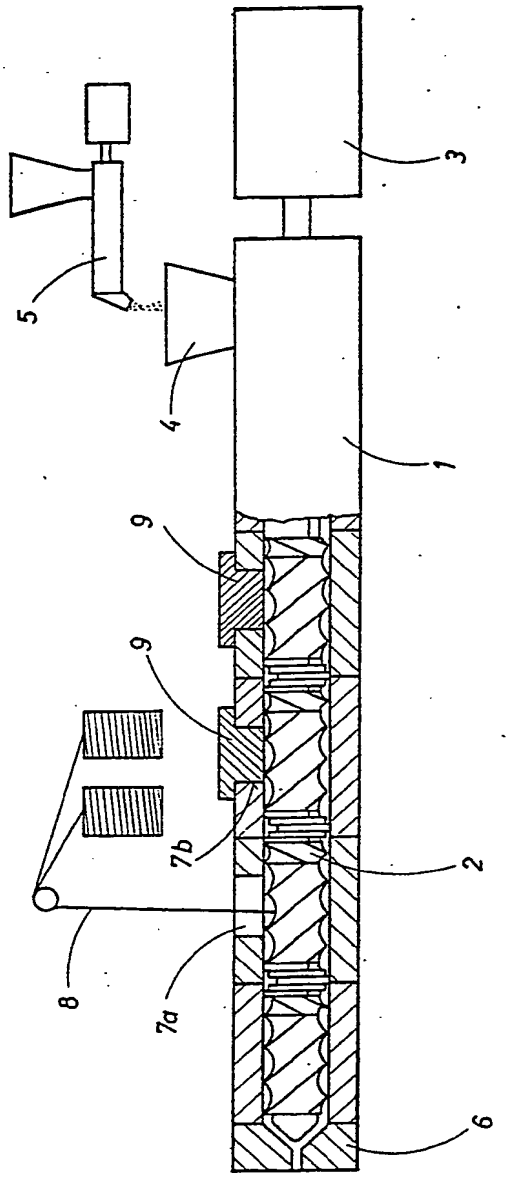

Fig.2

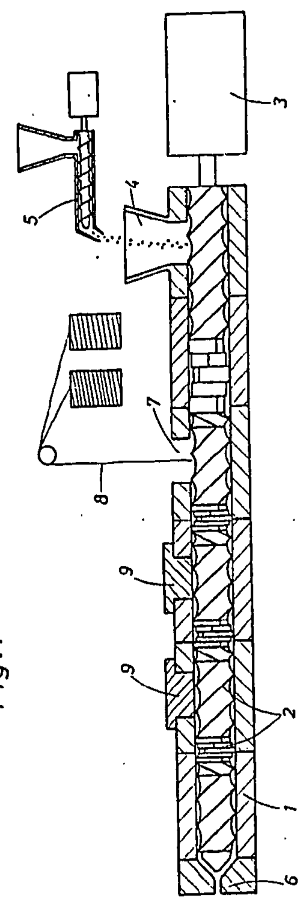

Fig.1

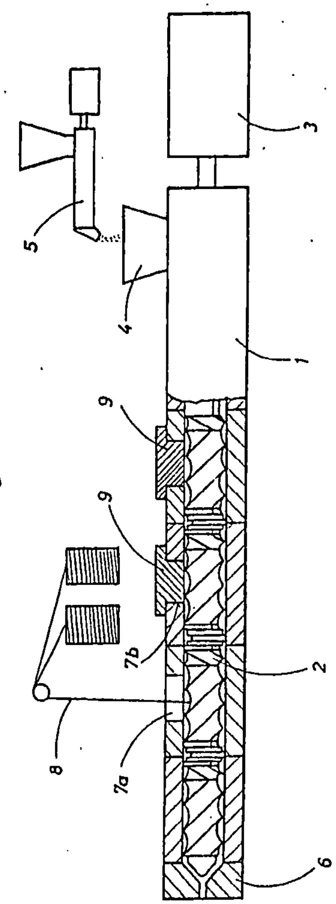

Fig.2

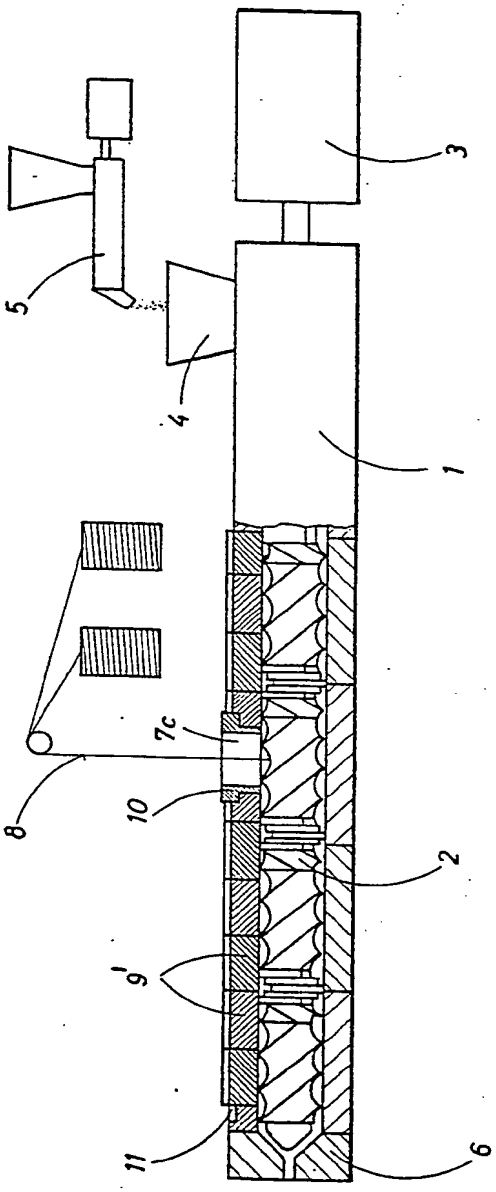

Fig.3

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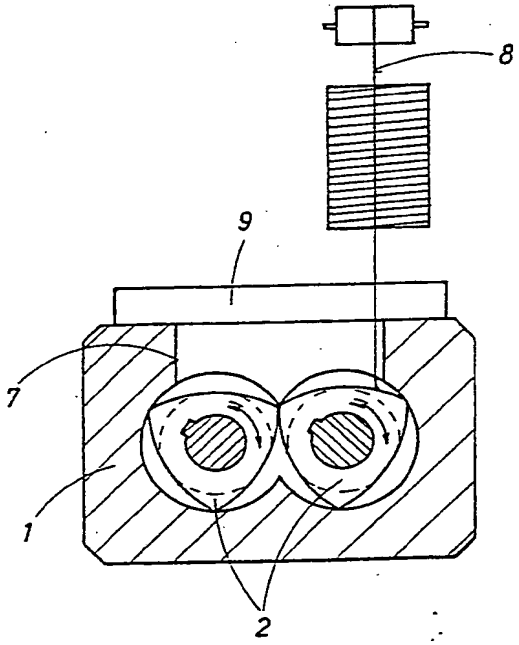
Sheets 3 & 4

3

Fig. 4



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Sheets 3 & 4

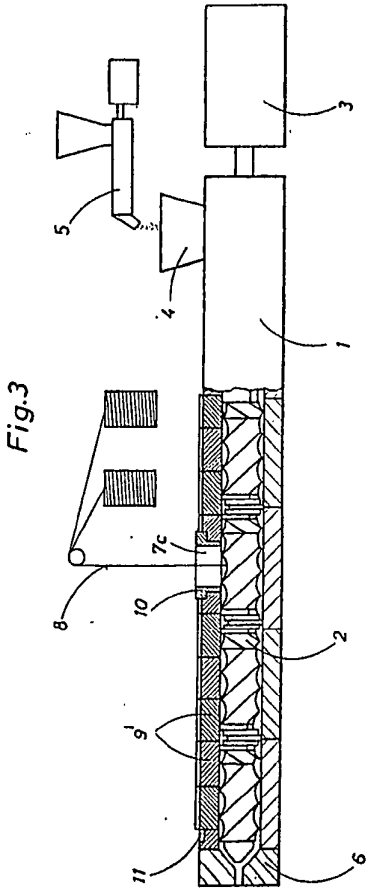

Fig.3

Fig.4